Ethylene Oxide Ambient Sampling Plan for Sterigenics (Willowbrook, IL)

Objective: Characterize ambient concentrations of Ethylene Oxide (EtO) around Sterigenics facility to inform the following issues:

- Determine the maximum and longer-term concentration(s) in proximity to the facility
- Explore relationship of ambient concentrations to facility operations (vents/fugitive) and EtO usage
- Characterize concentrations in potentially affected nearby neighborhoods to the extent possible based on method sensitivity

Method: The sampling will utilize the TO-15 method for Volatile Organic Compounds (VOCs) using stainless steel SUMMA™ canisters. The sampling duration will be 24-hour periods with the likely change-out times being in mid-morning (e.g., 10am to 10am) to facilitate logistics.

Sites: A total of six fixed sampling locations will be selected based on the EPA's latest dispersion modeling[1] of the two Sterigenics buildings and representative seasonal wind data[2]. The locations will include:

- Two locations at the maximum ambient air receptors in close proximity to the facility
- One location located in a predominant upwind location positioned far enough away to exclude source impacts in calm wind situations
- Three locations in residential neighborhoods potentially impacted by the perimeter of the dispersion modeling field and/or located in the predominant downwind direction during the monitoring period

Sampling locations will be chosen to avoid potentially biasing interferences such as cigarette smoke and direct vehicle emissions.

Sampling Frequency: Sampling will occur on a 1-in-3 day schedule for a 90 day period, based on the national sampling calendar. Region 5 personnel will handle the on-site logistics including canister shipping and field deployment.

Project Duration: Sampling will continue for a period of 3 months with a projected start-up date of approximately November 19, 2018. Project status will be evaluated in early March (following receipt of all analyses) to determine if any factors (e.g., invalid samples, facility shut downs) would lead to a short-term extension of the project.

Data Reporting and Validation: ERG[3] will validate and report data to OAQPS in 2-week increments. Samples for which identification acceptance criteria are not met will be reported as ND (which means "non-detect"). Concentration data less than the laboratory Minimum Detectable Limit (MDL) will be flagged with the qualifier code MD (which means less than MDL). The MDL will be reported with the concentration. Samples reported as non-detect values will be assigned a value of ½ MDL for averaging purposes. Validated data will be posted on a publicly available web site within 5 business days of ERG's reporting.

Region 5 will operate a portable meteorological station on the rooftop of their Willowbrook facility. Meteorological data will be averaged on an hourly basis and collected for the duration of the project to

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[1] Conducted by EPA/OAQPS, utilizing results from Sept 2018 source test

[2] Locations based on wind rose data from Midway airport

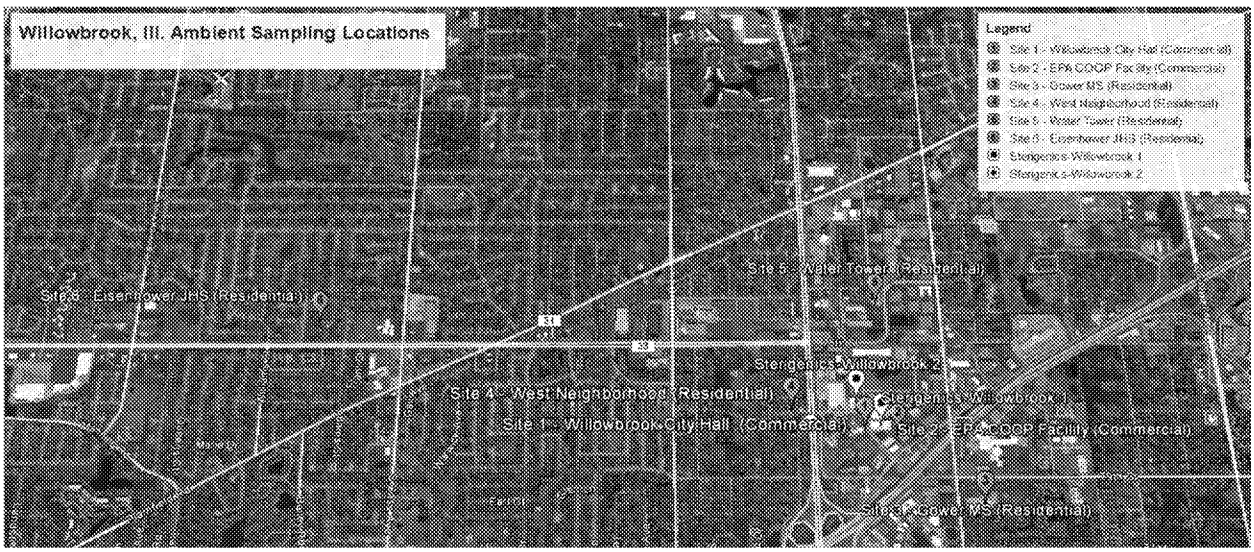
[3] Eastern Research Group – EPA's contract laboratory.

facilitate analysis. EPA will also work with Sterigenics to make production and EtO usage data available for correlation with ambient results.

Quality Assurance: One collocated canister will initially be deployed per sampling day at one of the maximum receptor locations to calculate precision. The location of the collocated sample may optionally be rotated through other sampling locations if early data results indicate above MDL readings at other than maximum concentration locations. Additional blank canisters and laboratory replicates will be employed per ERG's standard practice for the National Air Toxics Trends Station program.

Proposed Ambient Sampling Locations

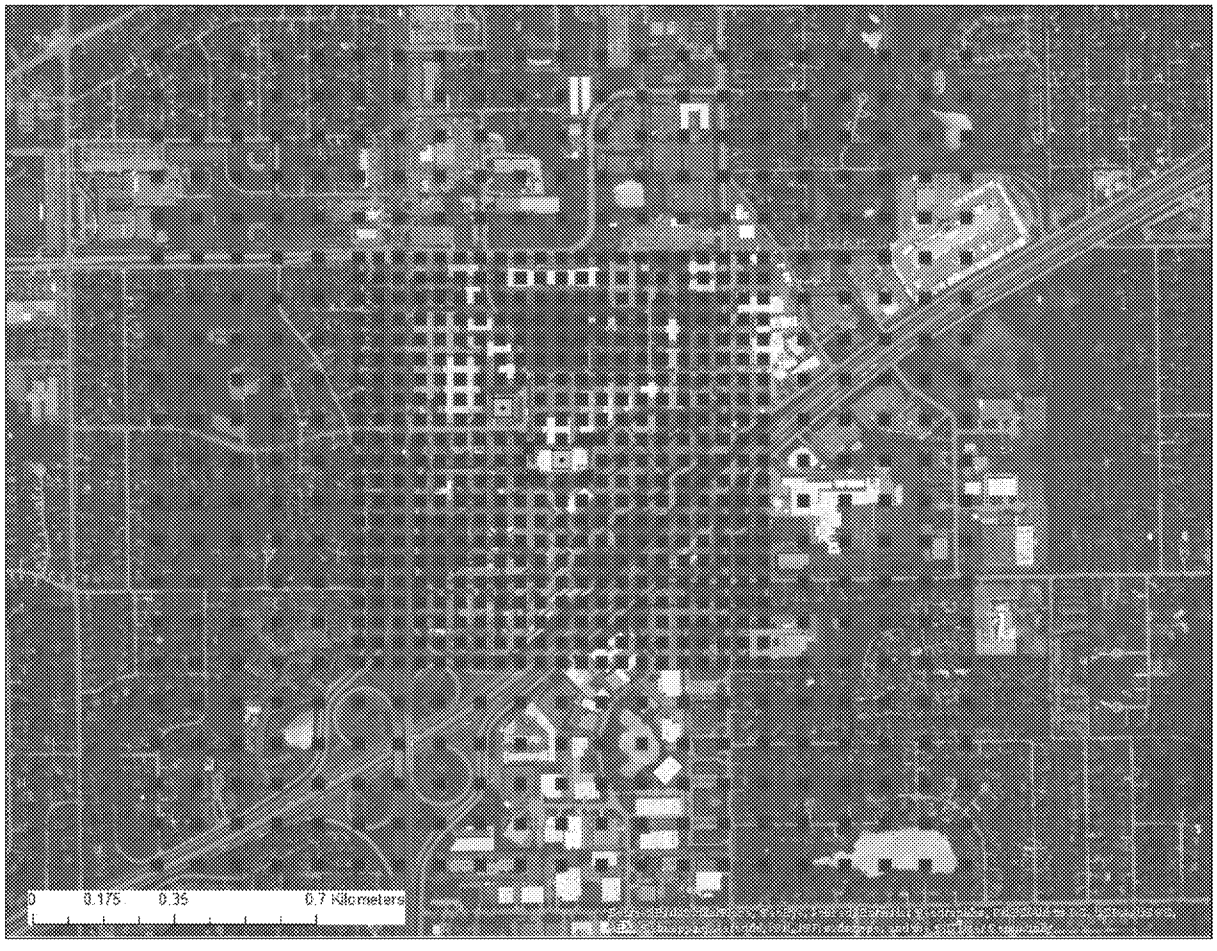
#	Name	Latitude	Longitude	Objective
1	Willowbrook City Hall	41.748471	-87.940782	Maximum Commercial #2
2	EPA COOP	41.748751	-87.939742	Maximum Commercial #1
3	Gower Middle School	41.745504	-87.934678	Residential Impact
4	West Neighborhood	41.749042	-87.945638	Residential Impact
5	Water Tower	41.754786	-87.939715	Residential Impact
6	Eisenhower Junior High	41.752997	-87.979985	Upwind



Modeling

Air dispersion modeling of Sterigenics was conducted using the latest version of the AERMOD modeling system (version 18081) to inform monitor placement. Emissions input to the model were based on stack results from September 2018 and emissions were modeled with the most recent 5 years of complete meteorological data, 2013 through 2017, using Midway International Airport for the surface meteorological data and Davenport, IA for upper air data. Midway is located approximately 15 km east of Sterigenics and thus adequately representative of the facility. A 2-km by 2-km receptor grid (758 receptors) was modeled and shown below with the Sterigenics facility denoted by the green squares.

Model Domain



Key metrics output from the model to inform monitor placement were:

- Maximum 24-hour concentration by receptor across the period of 2013-2017
- 5-year seasonal averages by receptor
- 5-year average by receptor

To inform the monitor siting, a scoring system was developed by ranking the maximum 24-hour concentrations across all receptors, ranking each 5-year average season's concentration by receptor, and ranking the 5-year average concentration by receptor, with rank=1 being the maximum concentration for each ranking. The score was calculated by adding the 24-hour ranking, each season's rank, and the 5-year average rank of each receptor. For example, a receptor that has the highest 24-hour average concentration, the highest winter, spring, summer, and fall average concentrations, and highest 5-year average concentration would have a score of 6 (1+1+1+1+1+1). The lower the score, the

higher the probability an area will see higher impacts from the facility. The results of the scoring, along with the monitor locations, excluding the upwind monitor, are shown below. The monitors' locations coincide with local minima (higher concentrations) of the receptor scores.

Monitor locations and Scoring Results